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6. — *Reisen in Indien und Hochasien. Von H. von Schlagintweit-Sakünlinski. III^{ter} Band. Tibet; zwischen der Himálaya- und der Karakorum - Kette.* Jena: Hermann Costenoble. 1872.

ANY one who has occasion to compare the more recent maps of High Asia with those of even ten years ago must be struck at the first glance with the extent and importance of the increase of our knowledge of the topography of that region. Only a few years ago, the maps of ancient and modern Chinese geographers, essentially improved by the astronomical observations of the Catholic missionaries commissioned by the Chinese government early in the last century, formed the cartographical basis for all the vast interior of Asia. During the first half of the present century, this frame-work was partially filled in with a large number of topographical details, obtained to a great extent by collecting and comparing the itineraries of native caravan routes. The discussion of these and of the occasional travels of Europeans by Klaproth, Humboldt, Ritter, Biot, and others, forms not only a literature by itself, but is a monument of inductive research in physical geography. But systematic exploration is now yearly lessening the area of the *terra incognita*.

The volume of which we have given the title is the general narrative of the explorations of the brothers Hermann, Adolph, and Robert von Schlagintweit in Tibet, between the Himalaya and the Karakorum range. The greater portion — nearly all — of the volume relates to travels and observations in the westernmost third of Tibet; the central and eastern portions, which constitute the political Tibet of to-day, remained almost wholly closed to these daring explorers.

The most important part of the one chapter treating of Eastern Tibet is that devoted to the question of the tributaries of the Brahmapútra. By most geographers, European and Chinese, the Dihong, the long stream which rises near Lake Mausaraur (Mauasarowa), and flowing eastward along the northern foot of the Himalaya, suddenly turns to the south, and enters the valley of Assam at Sudya, has been considered to be the only great source of that river. But Herr von Schlagintweit-Sakünlinski looks upon this as simply the chief of three tributaries; the other two being the Wei-tsu or Nu-kiang and the Lantsan-kiang, which have hitherto been regarded, respectively, as the upper courses of the two largest rivers of Farther India, namely, the Salween and the Meikou. The data on which this attempt to solve a hydrographical paradox of long standing is based do not seem to be sufficient, although they are strong as far as they go. These are found

in the facts that the Brahmapútra has a greater volume of water above the mouth of the Dihong than it receives from that stream, and that its valley retains its northeast course both above and below the entrance of the Dihong Valley. It would seem that next to actual exploration of the one (or three) river system in question, the most light might be obtained by a comparison of the times of high-water of the Brahmapútra above Sudya with those of the Irawaddy, Salween, Meikon, and Upper Yangtse-kiang. The Wei-tsu and Lan-tsan-kiang are supposed to have their sources in the same great region of snows and glaciers, to the melting of which the great summer flood of the Yangtse-kiang is due. If the Wei-tsu and Lan-tsan-kiang are the sources of the Salween and Meikon, then these latter streams should have floods corresponding in time to that of the Yangtse, certain allowances being made for difference of length and fall. If they are sources of the Brahmapútra, then the same correspondence with the Yangtse flood should exist above Sudya; and the Salween and Meikon floods should be due to the much earlier melting of snow on the much lower and more southern mountains of Northwestern Yunnan. It is not improbable that the Wei-tsu may be found to be a tributary of the Brahmapútra, while the Lan-tsan-kiang may be the upper course of either the Salween or Meikon.

The volume is chiefly devoted to a general narrative of the work of the brothers in the Italian province of Guári Khórsum; the English province of Spiti; the region of the salt lakes; and in Balti and Ladak. Guári Khórsum (Nari) is both the central elevation of Tibet geographically, and the westernmost province politically. It is in this province that the Indus, the Sutlej, and the Dihong branch of the Brahmapútra have their sources less than a score of miles apart.

In entering this province the brothers Adolph and Robert had their first view of Tibetan scenery. They had reached the top of the Kiúngar pass (17,331 feet elevation) on the 12th of July, 1855, and stood upon the sharply defined boundary between two extremes of climate. "The gloomy mantle of the rainy season was spread over the whole southern declivity of the Himalaya; while on the Tibetan side the last isolated cloud-masses vanished just north of the crest line, and the green mountain meadows, near the distant station Laptél, lay clearly defined in the full light of a sub-tropical sun."

Although the narrative is intended partly for the non-scientific reader, we miss in it almost every approach to sentiment, almost every trace of the poetry that must be aroused in the traveller in this unique world where Nature has her grandest throne, and where events pregnant with the destinies of races stand out boldly in the radiating vistas

of historic and prehistoric times. Here, if anywhere, we might expect a letting loose of the "nerve-currents."

But if the author does not give us pictures imbued with the color and life of subjectivity, it would seem to be because he has purposely eliminated this element as foreign and dangerous in purely scientific research. His pictures have a stereoscopic faithfulness; the lengths and breadths, distances, heights, and depths, are based on astronomic, trigonometric, and barometric observations, and on panoramic profiles; and the data for "atmosphere" abound in the results of long and careful meteorological research. But we may, nevertheless, thankfully recognize the true artist in the following philosophical definition of "atmosphere" and its effects on different landscapes:—

"So pleasant had been the impression produced by five days of cloudless heavens, that the few isolated cloud-masses which stood in bold relief on the blue sky made a depressing impression not less on me than on my native Tibetan companions. It might be supposed that one would, after a time, miss the ever-changing forms of the clouds; but experience has taught me that the pleasant effect of the brilliant lustre which the clear sky, notwithstanding its deep azure color, radiates upon these high mountains, is never equalled when the heavens are in any way covered.

"On the landscape, on the other hand, the influence of cloudiness and also that of dimness—whether this be due to minute dust-particles or to mist—is somewhat different; it is dependent upon the size of the object offered to view. With very great transparency of the air, whether brought about by rarefaction at a standpoint of high elevation, or by that degree of atmospheric moisture at which, without regard to the quantity of vapor present, condensation to mist has not yet taken place, only great forms show themselves quite satisfactorily; only those where the distances between the separate parts are so great that even by exceptional transparency of the air the contrasts of sharpness of outline and of light and shade are clearly visible. Here, and throughout High Asia, these conditions are satisfied by the colossal character of the surface configuration. . . . But in smaller mountains, or where the visual distance is small, the effect of the landscape is much increased by a diminished transparency of the air.

"What I had seen in my native Franconian hills I found repeated under the tropical illumination in Bahar, in Central India, and in Ceylon. Dimness of the atmosphere, when not too pronounced, produces distance in such landscapes, and only then do the various features become sufficiently individualized; in this manner, even the scenery in mountains of medium size often approaches in character that of grander mountain regions."

The routes of the brothers form a network on the map of Western Tibet. The greater part of this volume is devoted to discussions of the topography, surface geology, and climates along these routes,—a register of facts observed. The second volume contained a more gen-

eralized description of all High Asia, based very largely on the result of the Schlagintweit expeditions. The results of these journeys form one of the most valuable contributions to geographical knowledge made during this century.

The author's generalizations with regard to the surface configuration of the country are best seen in his map, compiled on a scale of 1 : 4,050,000, from the observations of the brothers Schlagintweit, and from those of the members of the Great Trigonometrical Survey.

In comparing this map with former representations of the same region, we are struck first by the extent to which the details of topography and political geography have been filled in, and next by the great persistence of the Karakorum range, which has only so recently been found to exceed all the mountains of the world in mean height, to be indeed "the culminating ridge of the earth." We observe a well-defined parallelism not only between the Himalaya, Karakorum, and Kwenlun ranges, but also among the ridges and valleys that lie between the two former. In at least several of the valleys thus formed there are immense deposits of tertiary fresh-water lakes, which in places, as in the basin of the Upper Sutlej, are more than 1,500 feet thick, and mark the extent of former large water areas. These have long been drained by an erosion which has deepened the outlets and cut backwards drainage channels often 1,200 to 1,500 feet deep in the tertiary strata of the lake bottoms.

The present lakes of Western Tibet are the remnants of these formerly grand inland seas, which at elevations of 5,000 to 15,000 feet washed the bases of mountains towering 5,000 to 10,000 feet above their mirrors. Herr von Schlagintweit devotes a chapter to a very interesting description of these lakes, and a discussion of their origin. Among them are the salt lakes, which, according to the author, owe their saline character wholly to absence of outlet, and to the consequent concentration by evaporation. An interesting fact is the occurrence of what seemed to be a kind of salmon in the double lake Tsomognalari. The upper lake is fresh, and empties during the time of high-water into the lower lake, which has no outlet, and is salt, and the fish seems to make its migrations between the two.

The disappearance of so considerable an area of water surface must have produced marked changes in the climate, and yet the author expressly states that there are no indications of a former general extension of the glaciers beyond their present limits. On the contrary, one of the unexpected results of their investigations was the discovery that the lowest glaciers of High Asia (allowing for the climatic zone in which they lie) reach to a relatively lower level than those of the Alps.

In only one instance did he find the traces of an extinct glacier, though he observed areas of diminished *nevés*; but both of these occurrences he considers as comparatively local consequences of the decrease of moisture due to the gradual drying up of neighboring lakes.

Perhaps future explorations on the more northern Kwenlun and Tlinshan may show the remains of a formerly far more extensive glacial action contemporaneous with the former submergence of the Siberian and Russian steppes.

There is a chapter discussing the Tibetan climate, which, owing to the elevated position of so great an area, and to its highly rarefied and dry air, is one of diurnal and annual extremes, but in which these extremes have a considerable regularity as regards times of recurrence. The dryness of the atmosphere has here for its necessary consequence a scarcity of soil; and in valleys of over twelve thousand feet elevation, as in Upper Spiti, large areas even of the valley plains are without even the color of vegetable soil. Isolated agriculture was found only near springs or along rivulets whose channels were not cut deep, or where irrigation was possible. But the volume gives, practically, no new information concerning the agricultural products of Western Tibet.

The articles of export are sheep's wool, the hair of the Tibetan goat for shawl manufacture, live sheep and goats, borax and coarse salt, and recently gold from the mines of Thok-jalung.

The principal imports are tea and grain, chiefly in form of flour; rice comes in large quantities from India. Tea comes still almost wholly from China. The low price of the Chinese "brick-tea" gives it an advantage over the tea of the Himalaya plantations, and, besides this reason, the Himalaya varieties are considered inferior in aroma to the Chinese. The commerce is conducted largely at fairs, and consists in an exchange of products in which one volume of salt is considered equal to one and one half volumes of flour; it was found that this was equal to one hundred pounds of flour or sixty pounds of rice for one hundred pounds of salt.

Although opium forms an important part of the merchandise which passes through Ladak on its way to China, it is not used at all by the natives.

"The goat of Tibet and of the countries lying to the north, and also of those immediately south, furnishes the best shawl material. This is the short wool — *pashm* — which lies under the long goat-hair."

Some interesting remarks concerning shawl-wool and shawl manufacture are quoted by the author from Dr. Watson's "Textile Manufactures, 1867," and may be reproduced in this notice.

"The dearest shawl-wool comes to Cashmere, not from Tibet, but from Turfán Kichar via Yárkland. It costs in Cashmere three to four shillings per pound for the uncleaned, and six to seven shillings for the cleaned. . . . In the manufacture of a shawl of the best material, weighing seven pounds, and selling in Cashmere for £ 300, the items of cost are, £ 30 for material ; £ 100 for labor ; £ 50 for expenditure on mechanical arrangements, etc. ; £ 70 for tax in Cashmere."

There is an attractive chapter on the interesting province of Ladak, which lies at an elevation of between 11,000 and 12,000 feet.

In regard to longevity, the inhabitants enjoy a moderately good average. But the population is small even when compared with the capacity of the land for supporting life, — a fact for which Herr von Schlagintweit finds an explanation in the prevalence of the Tibetan custom of polyandry. Although this remark is the only reference to this custom in this volume, it is a recognition of its existence, by a cautious observer. In this variety of marriage the eldest son of a household selects one woman to be the only wife of all the brothers, and the children are apportioned to the husbands successively in the order of the ages of the latter. The wife is said to be the head of the household, and to manage the affairs of all her husbands, however diverse the occupations of these may be.

Among the diseases common in Tibet is cretinism, which occurs even in the highest inhabited localities. Diseases of the eye are also frequent, and are caused to a great extent by the dust-storms of summer, and by the smoke that fills the houses in winter. But severe costiveness is the national trouble of the Tibetans, and is due, the author thinks, partly to the indigestible character of their food, and largely to permanent residence in a region of low barometric pressure and extreme dryness, and where, consequently, the body suffers a great loss of moisture by evaporation.

Besides the map, this volume contains seven finely executed full-page views of characteristic scenery, and a series of admirable panoramic profiles, in which three degrees of distance are defined by shading.